



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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August 10, 2004

STATE PROJECT: 33234.1.1 (B-3694)
F.A. PROJECT: BRZ-1138(9)
COUNTY: Rockingham

DESCRIPTION: Bridge No. 55 over Belews Creek on SR 1138 (Lindsey Bridge Road)

SUBJECT: Geotechnical Report – Foundation Investigation for Structure on -L- (SR 1138) over Belews Creek

Project Description

This project consists of a 165-foot long three span bridge to be constructed over Belews Creek, approximately 70 feet upstream of the existing structure. Proposed span lengths are 55 feet, 65 feet, and 45 feet. Skew ranges from 94° to 105°. The project is located in rural, southwestern Rockingham County.

Duke Power, owner of the bridge site property, operates the Belews Creek Steam Generation Plant several miles southeast of the site. The spillway from the Belews Lake dam empties into Belews Creek directly upstream of the project site. The plant regulates the amount of water released into the spillway depending upon their power generation needs.

The subsurface investigation was conducted during May of 2004 using a SIMCO-4000 TR track drill machine. Standard Penetration Test borings were performed at each of the four proposed bent locations. All borings were advanced until weathered or crystalline rock was encountered. Borings B1-A and B2-B were cored using NQ core equipment to recover rock samples from crystalline rock. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Test Unit for laboratory analysis. Rock core samples were also sent to the Materials and Test Unit to determine Unit Weight, Compressive Strength, Young's Modulus, and Poisson's Ratio.

Physiography and Geology

The project is located in the moderately hilly terrain at the western limits of the Piedmont Physiographic province. The site is situated adjacent to the floodplain the Dan River, which is located approximately 1200 feet to the west. The area is rural, with scattered single-family homes located along Lindsey Bridge Road. The floodplain area west of the site is generally level and is used for cultivation. The area east and north of the site is wooded.

Geologically, the project is located within the Milton Belt, and is situated adjacent to the Dan River Triassic Basin. The geologic boundary between rocks of the Milton Belt and the Triassic-age rock is covered by the alluvial floodplain soils just west of the site. Soils are derived from the weathering of the underlying metamorphic bedrock which is composed of gneiss and schist. These units are well foliated, and trend in a northeasterly direction.

Soil Properties

Soils encountered at the project site include alluvial and residual soils.

Alluvial soils were encountered at all bent locations except for End Bent One. The alluvial soils range from 5.0 to 13.0 feet in thickness. The stream bedload consists of gray, tan, and brown, loose to medium dense, dry to wet, coarse sand, gravel and cobbles (A-1-a) as shown on the Bent One cross-section. East of the creek channel, floodplain sediments are ten to twelve feet in thickness. These soils consist of orange-brown, medium stiff to very stiff, moist, silty sandy clay (A-6) and sandy silt (A-4) overlying tan-brown, medium dense moist sand (A-2-4) (see Bent Two and End Bent Two cross-sections). The alluvial soils overlie residual soil.

Residual soils range from 5.0 to 22.0 feet in thickness. The predominant residual soils consist of interbedded white, tan, and orange-brown, medium stiff to hard, dry to moist, sandy silt (A-4 and A-5), and orange and red-brown, medium dense, dry to moist, silty sand (A-2-4). A zone of orange-brown, medium stiff to stiff, moist, silty sandy clay (A-6) is present at End Bent One. The residual soils are derived from the underlying weathered rock.

Rock Properties

Weathered rock was derived from the underlying metamorphosed bedrock (gneiss), and ranges in thickness from 1.1 feet at boring EB1-A, to as much as 11.1 feet at boring B2-B. Weathered rock was encountered in each of the borings except for EB1-B.

Rock core was obtained from the interior bent borings (B1-A and B2-B) utilizing NQ core equipment. The rock at the Bent One location consists of dark gray, slightly weathered to fresh, moderately hard to hard, moderately close fractured, biotite gneiss to dark green-gray, slightly weathered to fresh, hard, moderately close fractured, calc-silicate gneiss. Rock from Bent Two consists primarily of white to dark green-gray, moderately severe to very slightly weathered, moderately hard, mica-gneiss. Overall core recovery ranged from 73% to 100%. Rock Quality Designation (RQD) values ranged from 0% to 60%. Ultimate compressive strength of the rock samples ranged from 6.0 to 16.2 ksi. More detailed rock descriptions can be found in the Core Boring Reports.

Groundwater

Groundwater was present in the borings that encountered alluvial soil. The groundwater elevations ranged from 565.0 to 565.7 feet. Surface water in Belews Creek was at elevation 566.0 feet (6-25-03).

Notice

This Geotechnical foundation report is based on the bridge survey report for Belews Creek dated December 16, 2003 and the Preliminary General Drawing dated January 7, 2004. If significant changes are made in